

1.

The sum of the digits of a certain two-digit number is 14.

If the digits are reversed, the number is increased by 18. Find the number.

2.

$$\text{Let } x = \frac{\sqrt{7} + \sqrt{3}}{2} \quad \text{and } y = \frac{\sqrt{7} - \sqrt{3}}{2}$$

then the value of $x^2 - xy + y^2$ is...

$$\text{If } y - 2\sqrt{y} - 8 = 0, \quad \text{Let } x = \sqrt{y}$$

then what is the value of y ?

3.

4.

If the sum of the first 100 positive odd integers is subtracted from the sum of the first 100 positive even integers, then the result is ...

5.

If $\sin 2\theta = 0.69$, and θ is an acute angle, then what is the value of $\sin \theta + \cos \theta$?

(Recall $\sin^2 x + \cos^2 x = 1$ and $\sin 2x = 2\sin x \cos x$)

6.

If x and y are non-zero and $x^2 + y^2 = 3xy$

then what is the value of $\frac{x}{y} + \frac{y}{x}$?

7)

Compute $\sqrt{3 + \sqrt{3 + \sqrt{3 + \dots}}}$.

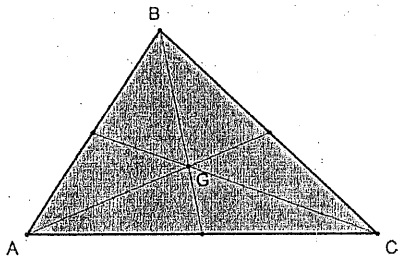
8.

Let T denote an equilateral triangle. If the inscribed circle of T has an area of 5, then what is the area of the circumscribed circle of T ?

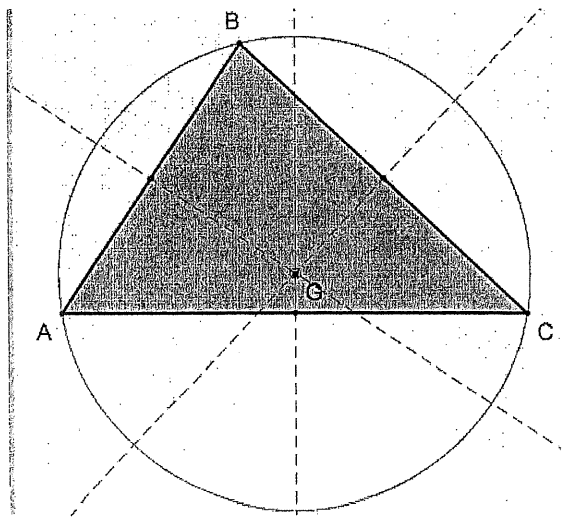
Centers of Triangles

The **Centroid** of a triangle is the intersection point between the three medians of a triangle. The centroid divides each median in a ratio of 2:1. In other words, the centroid will always be $\frac{2}{3}$ of the way along any given median.

1.

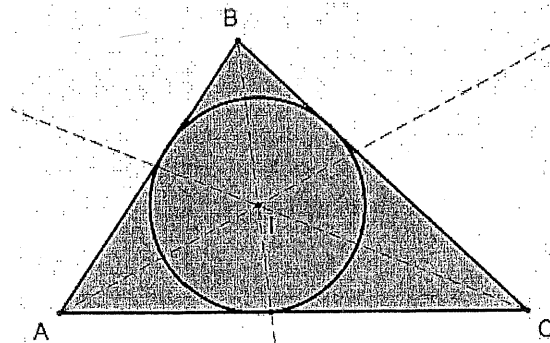


2. The **Circumcenter** of a triangle is the center equidistant from all the vertices in the triangle and is on the perpendicular bisectors of the triangle (The **circumcircle** is the circle that includes all three vertices of the triangle on the circle) of the triangle.



3. The **Incenter** of a triangle is the intersection point of the angle bisectors of each angle inside the triangle, and lies interior in the triangle in which it is equidistant from each vertex of the triangle.

The incenter is also the center of the **incircle (inscribed circle)** of the triangle.



4. The **Orthocenter** of a triangle is the common intersection point between the altitude lines of a triangle

